WHAT IS CLAIMED IS:

1. A nucleic acid molecule comprising a sequence of nucleotides that encodes an HPV31 L1 protein as set forth in SEQ ID NO:4, the nucleic acid sequence being codon-optimized for high level expression in a yeast cell.

2. A vector comprising the nucleic acid molecule of claim 1.

3. A host cell comprising the vector of claim 3.

4. The host cell of claim 3, wherein the host cell is selected from the group consisting of: *Saccharomyces cerevisiae, Hansenula polymorpha, Pichia pastoris, Kluyvermyces fragilis, Kluyveromyces lactis,* and *Schizosaccharomyces pombe.*

5. The host cell of claim 4, wherein the host cell is *Saccharomyces cerevisiae.*

6. The nucleic acid molecule of claim 1, wherein the sequence of nucleotides comprises a sequence of nucleotides as set forth in SEQ ID NO:2.

7. A vector comprising the nucleic acid molecule of claim 6.

8. A host cell comprising the vector of claim 7.

9. The nucleic acid molecule of claim 1, wherein the sequence of nucleotides comprises a sequence of nucleotides as set forth in SEQ ID NO:3.

10. A vector comprising the nucleic acid molecule of claim 9.

11. A host cell comprising the vector of claim 10.

12. Virus-like particles (VLPs) comprised of recombinant L1 protein or recombinant L1 + L2 proteins of HPV31.

13. The VLPs of Claim 12 wherein the recombinant L1 protein or the recombinant L1 + L2 proteins are produced in yeast.

14. The VLPs of claim 13, wherein the recombinant L1 protein or recombinant L1 + L2 proteins are encoded by a codon-optimized HPV31 L1 nucleic acid molecule.

15. The VLPs of claim 14, wherein the codon-optimized nucleic acid molecule consists essentially of a sequence of nucleotides as set forth in SEQ ID NO:2 or SEQ ID NO:3.

16. A method of producing the VLPs of Claim 14, comprising:

(a) transforming yeast with a codon-optimized DNA molecule encoding HPV31 L1 protein or HPV31 L1 + L2 proteins;

(b) cultivating the transformed yeast under conditions that permit expression of the codon-optimized DNA molecule to produce a recombinant papillomavirus protein; and

(c) isolating the recombinant papillomavirus protein to produce the VLPs of Claim 14.

17. A vaccine comprising the VLPs of Claim 14.

18. Pharmaceutical compositions comprising the VLPs of claim 14.

19. A method of preventing HPV infection comprising administering the vaccine of Claim 17 to a mammal.

20. A method for inducing an immune response in an animal comprising administering the VLPs of Claim 14 to an animal.

21. The virus-like particles of Claim 14 wherein the yeast is selected from the group consisting of *Saccharomyces cerevisiae, Hansenula polymorpha, Pichia pastoris, Kluyvermyces fragilis, Kluyveromyces lactis,* and *Schizosaccharomyces pombe.*

22. The virus-like particles of claim 21, wherein the yeast is *Saccharomyces cerevisiae.*

23. The vaccine of claim 17, further comprising VLPs of at least one additional HPV type.

24. The vaccine of claim 23, wherein the at least one additional HPV type is selected from the group consisting of: HPV6, HPV11, HPV16, HPV18, HPV33, HPV35, HPV39, HPV45, HPV51, HPV52, HPV55, HPV56, HPV58, HPV59, and HPV68.

25. The vaccine of claim 24, wherein the at least one HPV type comprises HPV16.

26. The vaccine of claim 25, further comprising HPV18 VLPs.

27. The vaccine of claim 26, further comprising HPV6 VLPs and HPV11 VLPs.

28. A nucleic acid molecule comprising a sequence of nucleotides that encodes an HPV31 L1 protein, the nucleic acid molecule free from transcription termination signals that are recognized by yeast.

29. A vector comprising the nucleic acid molecule of claim 28.

30. A host cell comprising the vector of claim 29.

31. The host cell of claim 30, wherein the host cell is selected from the group consisting of: *Saccharomyces cerevisiae, Hansenula polymorpha, Pichia pastoris, Kluyvermyces fragilis, Kluyveromyces lactis,* and *Schizosaccharomyces pombe.*

32. The host cell of claim 31, wherein the host cell is *Saccharomyces cerevisiae.*

33. The VLPs of claim 13, wherein the recombinant L1 protein or recombinant L1 + L2 proteins are encoded by a HPV31 L1 nucleic acid molecule that is free from transcription termination signals that are recognized by yeast.

34. A method of producing the VLPs of Claim 33, comprising:

(a) transforming yeast with a DNA molecule encoding HPV31 L1 protein or HPV31 L1 + L2 proteins, the DNA molecule free from transcription termination sequences that are recognized by yeast;
(b) cultivating the transformed yeast under conditions that permit expression of the DNA molecule to produce a recombinant papillomavirus protein; and
(c) isolating the recombinant papillomavirus protein to produce the VLPs of Claim 33.

35. A vaccine comprising the VLPs of Claim 33.

36. Pharmaceutical compositions comprising the VLPs of claim 33.

37. A method of preventing HPV infection comprising administering the vaccine of Claim 35 to a mammal.

38. A method for inducing an immune response in an animal comprising administering the VLPs of Claim 33 to the animal.

39. The vaccine of claim 35, further comprising VLPs of at least one additional HPV type.

40. The vaccine of claim 39, wherein the at least one additional HPV type is selected from the group consisting of: HPV6, HPV11, HPV16, HPV18, HPV33, HPV35, HPV39, HPV45, HPV51, HPV52, HPV55, HPV56, HPV58, HPV59, and HPV68.

41. The vaccine of claim 40, wherein the at least one HPV type comprises HPV16.

42. The vaccine of claim 41, further comprising HPV18 VLPs.

43. The vaccine of claim 42, further comprising HPV6 VLPs and HPV11 VLPs.